ABSTRACTS PRESENTED AT THE ANNUAL MEETING

BOTANY SECTION

EDWARD W. CHESTER, Chairman

Further Studies on the Effects of Mammalian Carcinogens on Cinnamon Fern Leaf Development. JAMES D. CAPONETTI, University of Tennessee.

Cinnamon fern leaf primordia cultured in vitro offer a system for evaluating the effects of mammalian carcinogens and other chemical compounds on the growth and development of leaves. Representatives of several groups of mammalian carcinogens and related compounds have been tested for their effects on the development of cinnamon fern leaves in sterile culture. The results thus far have shown that a nitrosamine and four benzo (a) pyrenes inhibit the growth of the leaves when compared with controls. An aflatoxin and a benz (a) anthracene stimulate the growth. Mature leaves are taller than controls and bear more leaflet pairs. Another benz (a) anthracene and a carcinogen promoter have no differential effect on the leaves; growth is similar to controls. In those instances where leaves reached cultural maturity, differentiation of leaf parts appeared to proceed normally as in controls. In no case did leaves produce callus tissues or turgidous growths.

Reversal of IAA and GA Induced Pea Epicuticular Elongation by Alternate Electron Transport Inhibitors and Concavanalin A. W. H. ATKINSON and B. P. STONE, Austin Peay State University.

A study was conducted to determine the roles of alternate electron transport and cell membrane receptors in hormone induced epicuticular elongation of Pisum sativum variety "Little Marjor". An inhibitor of the electron transport system, 8-hydroxyquinoline, was effective in blocking epicuticular elongation in tissue treated with indoleacetic acid and gibberellic acid. Elongation was not reinstated upon addition of ATP. The lectin concavanalin A was also effective in inhibiting the hormone induced elongation. This inhibition could be reversed by the addition of mannose. These data suggest that both the alternate electron transport system and cell membrane receptors are involved in hormone induced elongation of epicuticular sections.

Light Quality in Relation to Expansion of Avena Coleoptiles and Coleoptile Segments. FREDERICK T. WOLF, Vanderbilt University.

Growth in length of coleoptiles of intact Avena seedlings, of decapitated coleoptile segments, and of apical coleoptile segments which included the tip was compared in equal intensities of various wavelengths of light with that which occurred in darkness. Light has no effect on the growth of decapitated segments, which was comparable to that at darkness in all instances. Growth of apical segments including the coleoptile tip is inhibited at 510-565 nm and stimulated at 605-700 nm. Growth of coleoptiles of intact seedlings is inhibited by light at 455-565 and at 660-700 nm, though not at intermediate wavelengths. Possible interpretations of these different responses will be discussed.

Carbohydrate Inhibition of Pigment Formation in a Pigmented, Aspergillus Mutant of Bacillus cereus. THEODORE E. SNAZELLE, The University of Tennessee at Nashville and DAVID W. COOK, Gulf Coast Research Laboratory, Ocean Springs, Mississippi.

Production of large, orange-pigmented colonies of Bacillus cereus (GCRI-29) on Difco Marine Agar 2216 (contains no carbohydrate) is inhibited by the incorporation of 0.5% glucose (5 g/liter) to 1% glucose (10 g/liter or 1% mannose into this medium resulting in the formation of small, white colonies. When the Difco medium is supplemented with 1% arabinose or 1% raffinose, B. cereus causes the formation of medium-sized, pale orange-pigmented colonies with arabinose or large, orange-pigmented colonies with raffinose. Production of orange pigment by B. cereus is seemingly related to the utilization of protein as a carbon source rather than a carbohydrate. Thus, if a carbohydrate is utilized by B. cereus, orange pigment will not be produced.

Isozymes as Taxonomic Indicators of Polyplodoraceae (Basidiomycetes). JOHN W. HARRIS, S. K. BIALLAL, and FRANK P. SANDERS, JR., Tennessee Technological University.

In recent years, electrophoretic banding patterns of isozymes have been utilized to supplement conventional criteria for characterizing certain fungal taxa. Previous work in this laboratory has suggested that such patterns provide useful information about taxonomic relationships between isolates of species belonging to the family Polyplodoraceae. In the present study, mycelial extracts of two isolates of one species of Fomitopsis and four isolates of two species of Fomes were subjected to polyacrylamide gel electrophoresis. The results were analyzed by computer, using a hypergeometric distribution model, in order to compare the banding patterns of the different isolates. The results substantiate our previous conclusions regarding the usefulness of these procedures for clarifying relationships between fungal taxa.

Somatic Mutation Induction in Tradescantia, P. S. KAHLOM, Tennessee State University.

Tradescantia clone 4430 heterozygous for flower color was used as a test system to induce mutations with ethyl methane sulfonate (EMS). The objective was to determine the effect of pH, Concentration of mutagen and duration of treatment on the frequency of mutations. The Stamen hairs were analyzed for: 1) intact events thought to be due to a point mutation or segmental deletion, 2) non pigmented cells, 3) dwarf cells and (4) giant cells.

Branches from potted plants ready to bloom or having 1 or 2 flowers open, were cut close to the ground. These cuttings were placed in EMS solutions prepared in 0.1 molar phosphate buffer and constantly aerated for the time indicated. After the exposure, the cuttings were rinsed with sodium thiosulfate to remove unreacted mutagen. The cuttings were then grown in beakers containing nutrient solutions. The stamen hairs from these cuttings were analyzed for mutation frequency. The data indicate that the number of flowers is reduced. (Supported by CSRS grant no. TENX-PR-0007-35884)

Fossil Flora of the Friar Branch and Boyd Buchanan School Sites. H. R. DESEL, The University of Tennessee, Knoxville and J. L. BROWN, The University of Tennessee, Chattanooga.

Excavations for the construction of Friar Branch Lift Station, Corridor 47A of the City of Chattanooga's Interceptor Sewer Program, and for interceptor sewer lines near Boyd Buchanan School revealed the existence of an organic deposit below a 14-foot depth along South Chickamauga Creek at Chattanooga, Hamilton County, Tennessee. Logs were dated at 10,270, 9,515, 4,475, and 4,465 years before 1950, at a time when late Paleo-Indian and subsequently Archaic peoples could have occupied the area. The flora of the deposit was examined, and leaves, fruit, seed, wood, and thorns were used to determine the 32-plant taxa found. The flora approximates one which would be found today in similar sites, suggesting that the climates of that time were not greatly different from those of today.

Indirect Ordination of Forest Stands of the Northwest Highland. RICHARD J. JENSEN, Wright State University.

Twenty-eight forest stands in Montgomery and Stewart Counties, Tennessee were sampled using a modified random-pairs method. The data were analyzed by reciprocal averaging, an analog of principal component analysis. Forty tree species were used as the basis for ordinating the stands. Tree species included those that a) occurred in at least four stands and (or b) had a frequency of 10% or higher in at least two stands. Ordinations were prepared with two data sets: one with the species coded present/absent and the second with species coded by their frequency values. The reliability of reciprocal averaging is indicated by the two ordinations being virtually identical, both for species and stand ordinations. The first factor extracted apparently reflects moisture and temperature conditions while the second seems to reflect soil conditions. Results presented are compatible with
A study of the Weathering and Aging of Plutonium. David T. Farhan, Tennessee Technological University. A long-term project of perhaps 20 years duration involving plutonium, the author has been investigating the effects of the environment on the plutonium at the ARL Linde Ecole Reserve (ALER) in Richland, Washington. During the past few years, core samples of Pu-contaminated soils have been collected during the freezing and melting cycles to grow chrysotile, barite, and pyrite. Alpha-counting of the core samples has been done to obtain a solution of the material and the soil column of the lysimeter by the three to eight cycles. They skied the surface of the plateau based on species composition. The white oxalate, charcoal, and black oxalate, community types are fertilized with the help of various species, such as the black oxalate, and mixed post-oxalate community types are successional. The Virginian pine community type is believed to be stable or successional, depending on local site conditions.

Ecological Survey of Dick Cowan, Snyder, Tennessee, Ross Hinkle, Paul Schlager, and R. R. DeSimone, The University of Tennessee. Dick Cowan, which is located on the western edge of the Cumberland Plateau, near the town of the Upper Cumberland, supports one of the best examples of old growth forest extant on the eastern side of the Cumberland Plateau. Part of an ongoing study of the vegetation of the Cumberland Plateau in Tennessee, Dick Cowan was examined during the summer of 1977. Fifty-five 1/2 acre (0.22 ha) circular plots were placed in the stand using a stratified random sampling scheme. The importance values of 23 canopy species were submitted by sample in an agroecological sampling technique which yields seven community types. Use of canonical analysis to establish the distinctness of the communities revealed three (Cerin), Ulva, and Tilia-Saple, Ceonothous, Oxalis, White Oak-Northern Red Oak and Northern Red Oak-White Hickory) are distinct and three (Hualapai River-Texas North R. Red Oak and White Oak-Tulip-Red R. Red Oak) are much less so. The recurrent communities at Cowan are similar to those at Brasier's (1975) Mixed Mesophytic types of the Cliffs Section of the East Tennessee Highland. The more important communities at Dick Cowan are listed in Table 1. The analysis of the Dick Cowan data did not differ significantly from the analysis of the Brasier (1975) Cliffs Section data, although some of the important community types at Dick Cowan are different.

Indirect gradient analysis (Reciprocal Averaging) suggests that segregation of the communities on the landscape may be related to soil moisture or pH and soil type.

Linear Predictive Processing of Speech with Additive Noise

David W. Yarbrough and Ray Kinslow, Cochairmen

The most successful method for the analysis of speech is the linear predictive analysis of the type described by Atal and Schroeder. The main advantage of this approach is that it can be applied to a wide range of speech recording conditions and that it provides a very accurate description of the speech signal.

The linear predictive analysis is based on the assumption that the speech signal can be modeled as a linear combination of past speech samples. This model is represented by the equation:

\[ y(t) = \sum_{i=1}^{p} a_i y(t-i) + x(t) \]

where \( y(t) \) is the speech signal at time \( t \), \( a_i \) are the reflection coefficients, \( p \) is the order of the prediction filter, and \( x(t) \) is the input speech signal.

The reflection coefficients \( a_i \) can be estimated from a block of speech samples using the Yule-Walker equations. The order \( p \) of the prediction filter can be chosen to be less than or equal to the length of the block of speech samples.

The linear predictive analysis has been used to model speech signals in a wide range of applications, including speech synthesis, speech recognition, and speech coding. The model is widely used in speech processing systems because it provides a compact and accurate representation of the speech signal.

The linear predictive analysis is also used in speech quality assessment. The quality of a speech signal can be evaluated by comparing the original speech signal with the reconstructed signal obtained by exciting the prediction filter with the original speech signal. The difference between the original and reconstructed signals is used to quantify the speech quality.

The linear predictive analysis has been applied to a wide range of speech signals, including speech signals recorded in noise, speech signals recorded in natural environments, and speech signals recorded in a variety of recording conditions. The model has been shown to be effective in modeling speech signals in a wide range of applications.

The linear predictive analysis has several advantages over other speech modeling techniques. The model is simple and compact, and it provides a good representation of the speech signal. The model is also easily implemented in software and hardware, and it can be used in a variety of speech processing systems.

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much less desirable. It was observed that when certain industrial wastes were absent from the overall municipal waste, organic removal was facilitated at all of the temperature levels investigated.

Survey of Near-Earth Tidal Flats with the Osprey
H. L. L. OEPFEL, The University of Tennessee Space Institute.

Of all the histories of the world, the Tides of the Earth have long been considered of great importance. Of all the bodies of water on the Earth, the oceans have a profound effect on the Earth's climate, weather, and even the formation of life itself. The tides, or the regular rise and fall of the ocean, are caused by the gravitational pull of the Moon and the Sun on the Earth. The study of tides and their effects on the Earth is called tidal science, or tidal science.

Quantitative Differentiation of the Wilcos and Culberson Formations in the Cottonwood Valley of Texas, Austin, Texas.

Jay S. Wink and W. H. C. Culberson, The University of Texas at Austin.

The study of the Wilcos and Culberson Formations in the Cottonwood Valley of Texas is of great importance in understanding the geological history of the region. These formations are important for their contribution to the understanding of the tectonic evolution of the area and for their potential for fossil discoveries.

Geology and Geography Department

PHILLIP R. KEMMERLY, Chairman

Quadrilateral Differentiation of the Wilcos and Culberson Formations in the Cottonwood Valley of Texas, Austin, Texas.

The Wilcos and Culberson Formations are important geological features in the Cottonwood Valley of Texas. They are characterized by their unique petrological and chemical compositions, which differ significantly from those of other formations in the region. These differences have been studied using a variety of methods, including petrographic analysis, geochemical analysis, and geophysical surveys.

The Wilcos Formation is characterized by its high content of quartz and feldspar, which are derived from the weathering of rock formations in the area. The Culberson Formation, on the other hand, is characterized by its high content of iron and manganese, which are derived from the weathering of iron and manganesebearing minerals.

These differences in composition have important implications for the understanding of the geological history of the region. They indicate that the Wilcos and Culberson Formations were deposited in different environments, with the Wilcos Formation being deposited in a more arid environment and the Culberson Formation being deposited in a more humid environment.

The study of the Wilcos and Culberson Formations is important for understanding the history of the Cottonwood Valley of Texas and for understanding the history of the Earth in general. It is hoped that this work will contribute to a better understanding of the geological history of the region and of the Earth.
In March 1977 a well preserved mastodon molar was discovered in Pond Creek, Chesapeake. Though the tooth has no price, unpunched records of Pleistocene (Wisconsin) vertebrates from North Carolina have shown that Pond Creek has steep banks that expose 10 feet of poorly bedded gravels with many well preserved mastodon teeth, the tooth suggests clay covering and little exposure to transportation. It is not known yet if the tooth was from a single bone that had broken off somewhere else. Pleco-clastic deposits on the tooth are not under study and may yield additional information.

About 120 feet downstream from the mastodon site, an 8 foot clay bed crops out in a wide basin across the creek. It yields abundant mammalian remains, including deer, racoon, nut-needle bodies, and scores of small wood fragments. Core samples of Pleistocene (Wisconsin) age have been obtained that is definitively of the Pleistocene age. Megalosaurus are poorly preserved and the species and size range is best determined. Mrs. Helen R. Delaouf of the University of Minnesota. Some Observations on “Alluvial” Fans in the Southern Appalachian. (Hunts Mills, Tennessee, Tennessee Technological University. Landforms similar in geometry to alluvial fans are common in the Southern Appalachians, but consist mainly of material more widely dispersed than that from Pleistocene and drift sections. Alluvial fans are mentioned for these deposits, under the name of “alluvial fans,” but it remains true that the basic sedimentary features alone appears to be difficult.

Two or more ages of Fans exist at many locations. Younger fans sediments tend to be mixed within older fan sediments, both on a large and small scale. Babies are more common on the surface of younger fan sediments, and deep weathering profiles have developed on the surface of older deposits. These profiles indicate that periods of fan aggradation are punctuated by periods of surface stability. Elsewhere, such a alternation has been associated with alternation between glacial and interglacial climates during the Pleistocene. However, some workers think the patterns are more complex and involved with large scale catastrophic failures that set debris flows on the slopes above the fans.

It may be possible to choose between these two hypotheses by looking at fans deposited along depositional areas. Geomorphic studies have shown that deposits over a wide region, as climatically induced instability or isostatically induced stability. Geomorphic studies have also shown that stable areas should be confined to relatively small areas and the total of more than one area has been the subject of several investigations, being used in an attempt to correlate deposits between fans. Such criteria include: clastic weathering, weathering and self-deposition of the materials.

Sheehan and Gereau in conjunction with a Drilling Recorder and a Rock Percussion Drill. H. R. Haver, Beaver Engineering, Inc. With the use of the drill core information, the basal sediments developed within the last 10 years has it been possible to greatly increase the stratigraphic resolution.

At a site in Middle Tennessee the Carroid Limestone Formation was evaluated using surface geoscience methods. The Carroid Limestone is a large, basin-enclosed body of limestone, and the Carroid Limestone is the most complex of all the Carroid-enclosed bodies. The Carroid Limestone is a large, basin-enclosed body of limestone, and the Carroid Limestone is the most complex of all the Carroid-enclosed bodies. The Carroid Limestone is a large, basin-enclosed body of limestone, and the Carroid Limestone is the most complex of all the Carroid-enclosed bodies.

MATHMATICIAN

Donald C. Ramsey, Chairman Developmental Societies: MATHMATICIAN State Technical College, HERBERT L. HOPPER, JR., Chatta- nooga State Technical Community College. A number of students enter many colleges and universities every year, and these institutions have developed a mathematics for the professional mathematical. This course includes applications in the engineering and scientific fields.

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of its rise outside the range are reported. In addition to the occasional necrotic lesion caused by the bite, and the less frequent intravascular bite lesion, there is also the limitation of paralysis of both legs (with residual effects after 4 yr) resulted.

Recent literature indicates the development of a serologic test and a lymphocytic transformation test for previous exposure to the virus of the vesiculovirus that is present in the vesiculovirus of both sexes contains eight proteins. The value of anticortinons in testing for the virus of the vesiculovirus has been available in the United States. Control measures include woodland burns.

Cases of brown recluse bite in Middle Tennessee are documented with color slides.

Anaphylaxis During the Civil War. D. I. B. A. and L. B. L. St. 
Jerome, East Tennessee University.

Asthma from the first time by the British medical officers in the Crimean War at Balaklava. American troops used other as an anesthetic agent in the Mexican War at Vera Cruz. Use of chloroform has improved that record in the Asian-Pacific War.

The various anesthetic agents and mixtures used in the Civil War, World Wars, and Vietnam authorities, are cited. The effect of anesthesia on surgical procedures, survey rates, shock, anesthesia and surgery.

Ultrasound of the Parametrical Parametrical Nerve From Rats with Hereditary Diaphragm. MARGARET W. HOUSTON, East Tennessee University.

Ultrasound and other methods were made of the parametrical nerve in the hypophysis of ram (Brahman strain) which has given a genetic defect for vasopressin synthesis. Neurosecretory cells of the nucleus, exhibit hyperplasia, atrophy, hypertrophy, necrosis, atrophy, and fibrosis. Cisterner of the endoplasmic reticulum in the hypophysis are more prominent in tissue sections than in vasopressin producing tissues frequently containing electron lacunae vacuoles are the most conspicuous. The nucleus and cell body vacuoles are usually absent in perikarya and axons. Small dense core vesicles are inscribed on elements of the sarcoplasmic reticulum in the cytoplasm.

Golgi complexes are often disarray and in individual cells a sharp contrast was made with the typical pleomorphic vesicles. One of this has connected with the smooth endoplasmic reticulum. Perikarya usually do not exhibit cytoplasmic lysosomes in neurosecretory cells from control animals. Other cells of the mesothelial resemble those in the central autonomic.

Pepticus in the Analysis and Interpretation of Sugars in the Blood. LEONARD B. VICTOR, University of Tennessee.

The presentation will briefly review pathophysiological considerations, distribution, handling, and other influences (nutrition, circadian) on the interpretation of laboratory results of laboratory tests.

Sudden Death Due to Spontaneous Rupture of the Spleen—Preliminary Report. VICTOR, University of Tennessee.

An 18 yr old male caucasian was found dead in his bathroom with a large open bite on his head and his body was in a fetal position. The body was missing for 10 days and had been treated for symptoms of varizootia the day before his death. Autopsy showed massive hemorrhage and the presence of alcopathic lymphocytes. Laboratory tests on post-mortem samples confirmed the diagnosis of infection of the spleen.

Morphologic Findings in a Fatal Case of Pancreatic Neoplastic Nodular Hyperplasia. Edwin S. O. Tjia, M.D., University of Tennessee, Health Sciences.

A 2 yr old male was found dead in his bathroom with a large open bite on his head and his body was in a fetal position. The body was missing for 10 days and had been treated for symptoms of varizootia the day before his death. Autopsy showed massive hemorrhage and the presence of alcopathic lymphocytes. Laboratory tests on post-mortem samples confirmed the diagnosis of infection of the spleen.

Luminal-Distance and Age Factors for Models in Molecular Science. RONNIE C. BACON, Louisiana State University.

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Electrophoretic Patterns of Ochotona pusillus and Four Species of Peromyscus

While electrophoretically examining Ochotona pusillus, scientists from the University of Pennsylvania collected from Oklahoma, Arkansas, Tennessee, and Mississippi. The results of the study were published in the journal *Science*. Several populations of the species were examined, and the data was used to identify genetic variation within populations.

ZOOLOGY SECTION I

Michael J. Harvey, Chairman


David R. Duvall, University of Tennessee at Martin

The abnormal cold and snowy winter of 1976-1977 was a significant event for the population dynamics of Eastern Bluebirds in northeast Tennessee. Data collected from the study were used to assess the impact of weather conditions on bird populations.

**Genetic Variation in Clethrionomys gapperi**

Melvin L. Bock and Michael L. Kenney, Memphis State University

Polyacrylamide gel electrophoresis was used to examine genetic variation in Clethrionomys gapperi collected from the Appalachian Mountains and the Piedmont region of North Carolina. Genetic variation is critical for understanding population dynamics and speciation in this species.

**Activity Patterns of the Fattened Perch Mouse, Lymnaea picta**

Michael C. Wulsten, Roger D. Dew, and Michael L. Kenney, Memphis State University

Activity patterns of two male and two female packet mice, Lymnaea picta, were studied near El Cobre, Cuba, from December 1976 to January 1977. The results suggest that this species is diurnal and active during daylight hours.

**Population Densities of the Raccoon, Procyon lotor, Donald A. S. Stewart, and Michael L. Kenney, Memphis State University**

Population densities of the raccoon (Procyon lotor) were investigated at two sites in Shelby Wildlife Management Area, Colusa, California. The study was conducted from February to April 1976 and revealed that raccoon densities were lower in the second area studied.

**Loci Variation in Clethrionomys gapperi**

Leif M. L. Ottosen, University of Tennessee at Martin

Loci variation in Clethrionomys gapperi was examined from 90 to 100 different populations. The results suggest that this species has undergone significant genetic variation over time.

**Interracial variability in bicheinical characters of the raccoon (Procyon lotor)**

Michael D. Truett, University of Tennessee at Martin

Interracial variability in biochemical characters of the raccoon (Procyon lotor) was studied to examine genetic variation within populations. The results suggest that this species has undergone significant genetic variation over time.
In December 1978, a two-year study of several rivers and lakes in Tennessee, Cooperrider, was designed to evaluate ecological accommodation to pollution abatement systems. The study focused on the Oconee River drainage. Samples taken by Ponder, Sunar and artificial substrate were used in the study. A method for analyzing benthic population dynamics throughout the drainage basin.

The study was supported by the National Science Foundation. The results showed a positive trend in the population of benthic organisms, indicating success in the pollution abatement efforts.

**Water Quality Monitoring Using an Automated Biomonitor and Verification, M. Morgan and K. W. Muckley, Tennessee Technological University.**

This study investigated the effects of sediment particle size distribution and habitat availability in coastal wetlands. The results showed that habitat complexity is necessary for an effective regional monitoring network to be established. This requirement was met by deploying a benthic tractor, which was used to monitor sediment particle size distribution in the field.

**Water Quality and the Aquatic Organism**: The impact of water quality on aquatic organisms was studied. The results showed that water quality is a critical factor in the survival and reproduction of aquatic organisms.

**Collegiate Division**

**Effect of Thermal Stress on Predator-Prey Relationships, Richard J. Radford, Chairman.**

Previous research indicates that thermal stress alters many predator-prey interactions. This study investigated the effect of thermal stress on the interaction between predator and prey species. The results showed that thermal stress had a significant impact on the predator-prey relationship, altering the distribution of species in the ecosystem.

**Effect of Thermal Stress on Predator-Prey Relationships, Richard J. Radford, Chairman.**

This study investigated the effect of thermal stress on predator-prey relationships. The results showed that thermal stress altered the distribution of species in the ecosystem, affecting the predator-prey dynamics.

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